

Comparative Study of Resistivity Soundings and Lithologs in a Khondalitic Terrain in an Area Around Vizianagaram, A.P. , India

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Abstract

Over eighty vertical electrical soundings were conducted in a typical Khondalitic (Graneti Ferrous Sillimanite gneiss) terrain of Kandivalasa River-sub basin of Vizianagaram district of Andhra Pradesh, India. Forty two bore wells were drilled after observing geoelectrical data and local hydrogeological conditions. Lithologs and yieldlogs were systematically recorded for all the wells. Correlation has been made between lithology derived from drilling and resistivity sounding. While the drilling data revealed four distinct subsurface layers viz. (i) top soil (ii) highly weathered khondalite (Kaolinised layer) (iii) Moderately weathered and fractured layer (Aquifer layer) and (iv) basement of granitic gneiss, the geoelectrical data on the other hand could not delineate four subsurface layers at all the places owing to the lack of resistivity contrast between the kaolinised layer and potential aquifer zone. With the increase in thickness of the kaolinised layer the well yields were found to be drastically reduced and drilling operations became difficult.

Introduction

Nearly 65% of the total land area of India and 80% of peninsular India is occupied by hard rocks. The Major hard rock terrains in India are : 1. Granite terrain 2. Basaltic terrain 3. Khondalitic (Granulite) terrain. Fairly good amount of literature is available on hydrogeological aspects of granitic and basaltic aquifers where as very limited literature is available on khondalitic aquifers. The khondalitic terrain is one which is covered with khondalitic suite of hard rocks (garnetiferous sillimanite gneiss) which is the major rock type occurring in eastern ghats of India. Again these rocks exhibit variety of hydrogeological characteristics all along the eastern ghats. Mahadevan(1929) has pointed out that due to the action of water the khondalites are altered in two different manners. On the surface the rock changes into a lateritic soil and the subsurface formation when acted upon by water alters into kaolin. Sharma (1977) delineated four distinct subsurface layers viz., topsoil zone, weathered

kaolinised khondalite, fissured and fractured zone and hard rock basement.

Venkateswara Rao and Briz-Kishore (1990) opined that flat upland regions have greater ground water potential owing to the fracturing of khondalites than low lying areas where the khondalites are kaolinised. Nooka Raju and Jagan Mohan Rao(1990) have observed that the discharges are higher in khondalites intercalated with quartz veins and fractured quartz feldspathic gneisses than in feldspathic gneisses and weathered khondalitic suite of rocks. In the present paper, the geoelectrical investigations and the associated drilling results of a typical khondalitic terrain near cheepurupally region of Vizianagaram district of Andhra Pradesh, India is discussed.

Study Area

The study area is the kandivalasa river sub-basin (KRSB), a part of the main kandivalasa river basin and forms the part of survey of India topo